

WATERSHED URMP

FOR THE TIJUANA RIVER WATERSHED

WATER QUALITY ASSESSMENT

3. WATER QUALITY ASSESSMENT



Objective #1 of the Tijuana River Watershed URMP, as defined in the Introduction of the document, is to develop/expand methods to improve water quality within the watershed. Sections 3 and 4 have been developed in response to this objective.

3.a. Overview

The San Diego Copermittees have been required to implement water quality monitoring programs since 1993 under the previous municipal storm water permit. The initial copermittee monitoring program generally called for the collection, analysis and reporting of water quality data at the countywide level.

As noted earlier, the current Municipal Permit (effective February 21st, 2001 through February 21st, 2006) requires that the previous jurisdictional efforts be expanded to incorporate runoff management activities (including monitoring) at the watershed level, within the boundaries of 9 watershed management areas as delineated under the Municipal Permit. Additionally, under the Municipal Permit, monitoring program requirements (collection, analysis and reporting of water quality data) are also expected to transition during the five-year permit period from the current countywide approach to a watershed-based approach.

There are numerous water quality monitoring programs in the region, including collection and analysis of groundwater and reservoirs' data. In their efforts to assess the effects of urban runoff on receiving waters, the Copermittees' monitoring programs make use of a variety of methodologies to document the physical, chemical, and biological characteristic of streams, creeks, rivers, enclosed bays, lagoons, estuaries and beaches.

This document is designed to outline a uniform assessment strategy to link disparate monitoring programs to provide an evaluation of watershed conditions. At the present time, urban runoff is assessed and evaluated in a comprehensive fashion for wet weather impacts (chemistry, toxicity) and indicators of relative watershed health from an ecological perspective (rapid stream bioassessment). Other monitoring programs conducted by individual Copermittees (such as the dry weather or the coastal outfall monitoring programs) are yet to be considered.

3.b. Monitoring Programs

Issues concerning watershed health and ecological diversity, including water quality of receiving waters, span a variety of spatial and time scales. Many

questions related to these issues are generally governed under the Municipal Permit and fall primarily within the realm of one of three categories of monitoring research programs as described below:

Regional Monitoring Programs encompass a large spatial area (e.g., Southern California Bight), and look at many elements potentially impacted by storm water runoff. This type of monitoring includes the Regional Monitoring Program conducted by the Southern California Coastal Waters Research Project (SCCWRP) once every 5 years, and takes a longer-term view of the ultimate receiving waters, the coastal bays, lagoons, and the ocean. Regional monitoring is designed to answer questions concerning the ecological health of the entire Southern California coastline and encompass numerous components, including water and sediment quality, fish, benthos, birds, etc.

Core Monitoring refers to several long-term monitoring activities conducted by the Copermittees minimally on an annual basis. This is focused monitoring which concentrates on fewer parameters than Regional Monitoring efforts and serves to provide data to assess long-term trends within and across watersheds. Most of the Core Monitoring program activities (data collection, analysis, and reporting) will transition into a watershed-based approach within the next four years and have been designed under an adaptive strategy subject to review as warranted by new data or information.

Process Studies supplement both the Core and the Regional Monitoring activities described above. Process Studies are short-term evaluations designed to answer specific questions. Some examples of Process Studies include evaluation of the link between storm water discharges and Toxic Hot Spots, conducting DNA-ribotyping for bacterial source identification in a watershed, and source identification studies used for the development of Total Maximum Daily Loads (TMDLs) for 303(d) listed bodies of water. The Regional Board, Copermittees, educational institutions and other agencies generally collaborate in providing funding, management, and technical support for these type of focused investigations.

All these monitoring efforts are interrelated and are designed to allow and support complementary data collection and analysis. Periodic and detailed review of all findings in a structured manner is needed to ensure copermittee programs' objectives are met.

At the present time there is not one single assessment strategy to link these diverse programs together to get a "view" of watershed conditions. The water quality assessment conducted as part of this watershed based program has been designed and will be refined in the future to serve as the vehicle for this data integration effort.

3.b.1 Core Monitoring

The Core Monitoring Program is designed to achieve an understanding of the impacts of urban runoff on the water quality and ecological health of

receiving waters within each San Diego watershed through an evaluation of chemical, physical, and biological evidence.

The components of the Core Program are intimately linked and the evaluation of these components together allows for the long-term assessment of changes in water quality in individual watersheds. Components of the Core Program to be implemented during the life of the current Municipal Permit include:

- 1) Mass Loading Station Monitoring;
- 2) Urban Stream Bioassessment Monitoring;
- 3) Coastal Storm Drain Outfall Monitoring;
- 4) Dry Weather Monitoring;
- 5) Ambient Bay, Lagoon, and Coastal Receiving Water Monitoring;
and,
- 6) Toxic Hot Spots Monitoring in San Diego Bay

The Core Monitoring program, currently conducted on a countywide basis, has been designed as a adaptive program and is scheduled to transition to a watershed-based program by the end of the life of the current Municipal Permit in early 2006.

3.b.2 Core Monitoring Program: 2001 – 2002 Monitoring Season

The Core Monitoring Program implemented in October 2001 during 2001-2002 monitoring period included the following activities further described below:

Table 3-1: Copermittee Monitoring Program

Monitoring Activities	Where?	Season	Number of Sites	Analyses
Mass Loading Monitoring	Rivers	Oct 1- April 30	12	Chemistry, Bacteria, Toxicity
Urban Stream Bioassessment	Creeks, Streams, Rivers	Spring and Fall	TBD	Chemistry, Biology
Coastal Storm Drain Monitoring	Coastal Storm Drain Outfalls and Ocean	Year Round	TBD	Bacteria
Dry Weather Monitoring	Storm Drains	Summer	TBD	Chemistry, Bacteria
Bay, Lagoon, and Coastal Receiving Waters Monitoring	Bays and Lagoons	Summer	TBD	Chemistry, Bacteria

Mass Loading Monitoring.

Twelve regional mass loading stations (MLS) were scheduled to be monitored during the 2001-2002 wet-weather season over three separate viable storm events. A viable storm event is considered a minimum of 0.1 inches of rainfall. However, no viable storm event was recorded at the Otay River MLS and was therefore not sampled. Also, the MLS on the Santa Margarita River, located on Camp Pendleton, was only sampled during one viable storm event due to security reasons.

The 12 regional MLS are located within the following streams:

<i>Santa Margarita River</i>	<i>Tecolote Creek</i>
<i>San Luis Rey River</i>	<i>San Diego River</i>
<i>Agua Hedionda Creek</i>	<i>Chollas Creek</i>
<i>Escondido Creek</i>	<i>Sweetwater River</i>
<i>San Dieguito Creek</i>	<i>Otay River</i>
<i>Peñasquitos Creek</i>	<i>Tijuana River</i>

All sampling and analyses conducted for MLS was in accordance with applicable USEPA regulations and Regional Board staff guidance. One flow-weighted composite was collected along with one grab sample at each station during each storm.

The flow-weighted composite water samples were analyzed for the following parameters:

- *Inorganic chemicals* – Ammonia, Chemical Oxygen Demand (COD), total and dissolved phosphorus, nitrate, nitrite, total hardness, Total Kjeldahl Nitrogen, Total Dissolved Solids, Total Suspended Solids, Turbidity, MBAS (detergents).
- *Metals* (Total and Dissolved Metals) – Antimony, arsenic, cadmium, chromium, copper, lead, nickel, selenium, zinc.
- *Organophosphate pesticides* – Diazinon, chlorpyrifos.

The grab samples were analyzed for the following parameters:

- Temperature, pH, specific conductance, Biochemical Oxygen Demand (BOD), oil and grease, total coliform, fecal coliform, *Enterococcus*.

Additionally, storm water runoff samples collected at mass loading stations were also subject to toxicity tests (using *Ceriodaphnia dubia*, *Selenastrum capricornutum*, and *Hyaella azteca*). Toxicity testing is performed to assess the potential impact of complex mixtures of unknown constituents on aquatic life according to EPA standards. Toxicity testing can provide information on potential short-term “acute” effects, as well as longer-term “chronic” effects.

Rapid Stream Bioassessment Monitoring.

Macroinvertebrate and fish communities are considered excellent indicators of water quality. The residents of a water body function as continual monitors of environmental quality. Biological, chemical and physical stresses imposed on an aquatic ecosystem manifests their impact on the biological organisms present in that ecosystem¹⁴.

To date, the rapid stream bioassessment sites have been sampled in June and October of 2001 and May of 2002 as part of the copermittee monitoring program. The assessment was undertaken utilizing a protocol that samples and analyzes population of *benthic macroinvertebrates*¹⁵. A total of 23 stream sites located throughout the County were assessed. Sampling and analysis of protocols followed the California Stream Bioassessment Procedure, as standardized procedure developed for California by the Department of Fish and Game. This approach yields an enumeration of a stream's benthic community and assesses the quality and condition of habitat. Over time, this information is useful to identify ecological trends.

Biological assessments evaluate the condition of water bodies using surveys and other direct measurements of resident biological organisms (such as macroinvertebrates, fish, and plants). Biological assessment data are used to evaluate whether water bodies support survival and reproduction of desirable fish, shellfish, and other aquatic species (in other words, if the water bodies meet their designated aquatic-life beneficial uses).

Sampling of substrate samples for benthic infauna was conducted by MEC Analytical Systems (consultant team contracted by Copermittees) in June and October 2001 from each of 20 bioassessment monitoring stations and three reference stations (established in 2001) as shown in the figure below. Reference sites serve to provide data representative of generally undisturbed habitat within the watershed.

Bioassessment data considered to date exclude the 2002 surveys. These samples will be reported on as part of the 2002-2003 monitoring report. Field measures included pH, temperature, dissolved oxygen, conductivity, flow rate, percent gradient, sampling area physiography, and overall assessment of physical habitat (e.g., vegetative cover, bank stability) at each station.

Sample data from all Rapid Stream Bioassessment Monitoring stations were analyzed to simultaneously evaluate all the populations of benthic invertebrates and develop a relative assessment of ecological health by comparing survey stations against pre-determined reference stations. A Benthic Macro Invertebrate (BMI) ranking score was calculated from

¹⁴ Fox and Ashber 2002.

¹⁵ Bottom-dwelling (benthic) animals without backbones (invertebrate) that are visible with the naked eye (macro).

varied metrics and standardized to a zero point to allow for comparability amongst stations. A ranking score greater than zero indicates better stream health relative to the other streams sampled, whereas a score less than zero indicates deteriorated stream health. Streams are said to have an above average rating when the score is positive, that is, stream health is better than the average; and a rating below average is an relative indication of poor stream health.

In order to provide a general characterization of benthic communities within each watershed longer trend data sets than just the two surveys conducted by MEC in 2001, are preferred. For this reason, historic information from prior California Department of Fish and Game (CDFG) surveys was reviewed and summarized to prepare the benthic community assessment for each watershed. Bioassessment monitoring results from CDFG surveys conducted between May 1998 and May 2001¹⁶, and MEC surveys of June 2001 and October 2001 were considered to assess overall health of benthic communities of watersheds in the San Diego region.

¹⁶ SDRWQCB 1999; SDRWQCB 2001; CDFG unpublished data.

Figure 3-1: Bioassessment Monitoring Sites

